GAS JOURNAL, AUGUST 26, 1942

VOL. 239 94th YEAR No. 4136

EDITORIAL NOTES

FUEL SAVING

WE were privileged last Friday to attend the opening at Harrods, Ltd., London, of a Fuel Saving Exhibition. Mr. Tom Smith, Joint Parliamentary Secretary to the Ministry of Fuel and Power, performed the opening ceremony of what should be an extremely useful venture within the comparatively small circle which it will touch. It is essentially practical, and we believe that similar exhibitions in the Provinces, where they might well be made to influence a much higher proportion of the population than is possible in one London store, would be most helpful if jointly planned on non-partisan lines by all the fuel interests. The series of shops in Harrods' exhibition hall have been converted into model kitchens, living-rooms, bedrooms, bathrooms, &c., and in these rooms domestic economies are demonstrated from the point of view of all fuels concerned and all the methods of saving them, *e.g.*, space heating, water heating, cooking, lighting, refrigeration. The basic idea of the Exhibition is constructive; it tells people how they can save fuel. Thus, concrete examples are given on how to lag pipes, improve blackouts, screen off unwanted spaces, &c.

Hard on the heels of this well publicized London—therefore purely local—effort came the big advertising campaign, opened in the Sunday papers and backed by Commander Stephen King-Hall's impressive lunchtime broadcast. A section of the national Press has seen fit to decry this effort, based upon a "target" for each individual domestic consumer, on the grounds that such an appeal is indistinguishable from rationing, which the nation has been told can be avoided if voluntary saving on a sufficient scale can be effected. For our part we welcome the "target" scheme as making it quite clear that a *sufficient* scale is nothing less than that laid down in the White Paper. We were told that, in the absence of a great increase in coal production (which has failed to materialize), a certain tonnage must be saved in domestic consumption—whether by compulsory or voluntary means. Thereafter, a notion appeared to be prevalent that compulsory saving—or rationing—could, so to speak, be "bought off" provided that voluntary economy showed some kind of results, even if these fell short of what rationing would secure. As we have said before, we considered this a most dangerous idea, and we hope the target scheme will help to correct it.

PLATITUDINOUS

TO-DAY we conclude, with publication of the final replies of Authors to the discussion on their Papers, our recording of the annual meeting of The Institution of Gas Engineers. Since the meeting we have commented on several particular phases of the various Papers which appealed to us without in any way attempting to cover the whole ground. To do so would, indeed, be quite impracticable. We might, however, in concluding our report—which, though not verbatim, will, we think, be regarded as a balanced and comprehensive account in wartime circumstances—fill in a few gaps. As a matter of fact, we have not referred at all to the contributions of Mr. Finlayson and Dr. Chamberlain, and we have discussed Professor Townend's Paper, which in fact dealt broadly with education as it concerns the future of the Gas Industry, from the aspect—somewhat narrow, perhaps, but to our mind most important—of the relationship between the Industry and Leeds University and the opportunities which seem to present themselves for a closer and at the same time wider liaison.

To our mind, Mr. Finlayson's contribution gained rather than lost in merit because it was couched in simple terms. It was concerned solely with the bearing on national fuel economy of scientific control in the retort house, and the advice offered was cogent, straightforward, and very much to the point. The subject is obviously of primary importance now, at a time when we are confronted with problems set by erratic deliveries of coal of uncertain and in some cases unknown quality, and will remain of fundamental importance after the war. There may have been, and we think there were, some engineers at the Institution meeting who concluded hastily that Mr. Finlayson's Paper was too simple for the experienced carbonizer who knew his job and appreciated the significance of careful technical supervision. But there is a gulf of difference between knowing what to do to achieve better carbonizing results and putting this knowledge into practice. Platitudinous? We suggest that if the precepts advanced by Mr. Finlayson were translated into fact in the numerous small works and many of the less numerous larger gas-works in this country, the efficiency and the general tone of gas-works practice would be not a little improved. A contributor to the discussion remarked in no derogatory way that some features of the Paper might be dismissed by a casual observer as platitudes—note the word "casual." We very much like the hope which the Author expressed in his reply to the discussion—that in time to come the whole of his Paper would be regarded as a mass of platitudes. That time is not yet, and more's the pity.

We treasure the memory of a conversation we had with a friend some years ago about his experience in chatting with a prominent gas executive who was enthusiastic about a new process. "How does the process work?" asked our friend of its sponsor. Whereupon the executive brought forward a complicated-looking chart, a very graph-like affair, and said, "My dear fellow, look at the chart!" "Yes," replied our friend, "but what does the chart convey?" "Everything," said the executive, slightly exasperated, and, he added, "It is self explanatory; I can't explain it myself, but study the chart!" Now we never blamed the executive. Explanation of the chart was not his pigeon; he relied on the technical men he employed to make the chart; he took their advice; the process worked—and, incidentally, its success assisted his pocket. The moral? Surely, that it is a paying proposition to employ, trust, and give a fairly free hand to, technically trained men who can interpret to useful purpose the recordings of scientific instruments, the readings of analytical apparatus, the behaviour of plant as visually observed. It is platitudinous to state that the first step in scientific control in the retort house is to provide adequate technical supervision. Yet, to-day—assuming for argument's sake that adequate technical staff was available, which, of course, it is not—we think that there would persist, as Mr. Finlayson suggested, a tendency to regard the whole-time attention of a good technical man in the retort house as a luxury which can be afforded only by large gas undertakings. That he who runs may read, we quote this from his Paper: "On a carbonizing plant making a million cubic feet of gas a day for 250 days a year, the cost of a technical assistant at £350 a year is recovered if his work leads to an improvement in the gas yield of 1 therm per ton of coal accompanied by a reduction in the producer fuel consumption of 0.1 cwt. per ton of coal carbonized—a modest achievement which should easily be attainable." It would be interesting to know how many of the undertakings which produce more than a million cubic feet of gas a day have on their staff a technical man whose primary function is the control of the retort house. Two things are needed—a change of outlook on the part of management, and a ready supply of trained men keen to employ their knowledge in the belief that

their efforts will not fall on stony ground and their voices, however plaintive, on deaf ears. On the latter aspect, the supply of trained men, more anon.

Was Dr. Chamberlain's Paper platitudinous, as well as being helpful in the purely technical information and explanations advanced? If so, we hope that the platitudes are taken to heart and not casually dismissed by the observer. With the change from peacetime to wartime activities, much existing equipment is being used for processes for which it was never intended. Only by careful adjustment can efficient operation be achieved, and it devolves on the industrial gas engineer to demonstrate how this can be done. Again—we realize this has been brought out before, but it needs emphasis—with existing equipment heat treatment must be planned so that, as far as possible, appliances work at full load; maintenance periods with no load and long periods of operation below capacity should be avoided. With some processes this will present difficulty, but really substantial economy can be obtained by co-operation between departments in factories, thereby ensuring that production and heat treatment are synchronized. This has been shown time and again. With many processes, however, gas could be turned off or reduced to by-pass rates when no work is being processed, particularly between shifts or during breaks. Recent experience has shown that considerable economies can be achieved by this means—and without adversely affecting output. It is a question of making operatives conscious throughout their work of the fuel being used. The growing need for economy in industrial gas consumption does throw serious responsibility on the industrial gas engineer.

On the works and on the district the need for trained technicians becomes more and more apparent—still another platitude! It seems apparent, too, that the need is not being met. A fortnight ago, for example, we queried what encouragement post-war planners could possibly derive from the sorry story told by the Board of Examiners of the Institution's Education Scheme. We quoted from their report that, in regard to gas manufacture, the results were very disappointing, and candidates showed a lamentable ignorance of even elementary principles of design; in regard to distribution, that candidates failed to display fundamental, practical, or theoretical knowledge. Prior to that, commenting on Professor Towend's Institution Paper, we underlined that out of some 200 students who have passed through the Fuel Department at Leeds since 1920, only 53 have entered the Gas Industry. Including plant and appliance firms, the Industry as a whole has recruited into its ranks since the last war about four Leeds students annually, which, of course, is all very disheartening, and one wonders where all this talk about education in the Industry is leading. "We must have trained men" is a platitude. We are not recruiting a sufficient number of trained men. "Sulphur must go" is a platitude. Sulphur remains. The subjects are different, but the parallel in Gas Industry attitude is the same. What are we going to do about it?

THE INDUSTRY IN AUSTRALIA

IN this country we are debarred from publishing any statistics of Gas Industry production; the bar does not apply to Australia, and it is interesting to have figures covering the operations of the Industry in Australia for a complete war year. The latest available statistics relate to the year 1940, and some of the features of a wartime economy were to be expected—an increased demand for gas, particularly for industrial purposes, higher labour costs, lower coal stocks, and greater production of by-products. The growing importance of the commercial and industrial load—due largely, of course, to the utilization of gas in munition works and other establishments engaged in defence work—is indicated by the changing proportion of such sales to total sales, a change which would no doubt be very much more marked were the 1941 figures available. During 1940, industrial sales in Australia increased nearly 8%, while the increase in domestic sales was of the order of 3%. New Zealand statistics are not complete, but they also indicate rapid growth of the industrial load, with a stationary or even declining domestic demand. With the exception of Melbourne, sales per meter in the Australian metropolitan areas are actually below the 1930 level; Sydney, in the lead, had an average of 25,100 cu.ft. per meter. In New Zealand sales per meter improved, but the 1940 figure is only 19,100 cu.ft. Total sales in Australia amounted to 19,720 million cu.ft.; in New Zealand to 3,915 million cu.ft.

In spite of the difficulties caused by the war, many undertakings were able to extend the supply of gas to new areas and consumers. The number of consumers increased in all Australian areas, the increase being about 4% on the 1939 figure (21% on the 1930 figure). The estimated population of areas served by gas at the close of 1940 was 4,153,000. The New Zealand figures indicate a fall in the number of consumers. In both countries coke production increased, and in both countries there was a strong demand for tar, especially for fuel purposes; production of sulphate of ammonia also increased.

Regarding employment, naturally, owing to enlistments and the calling-up of men for military training, there was a decrease in the number of male employees in the Industry in both Australia and New Zealand—7% and 6% respectively, reductions accompanied by increases in salary or wages per employee. In New Zealand there was a considerable increase in the number of female employees.

Coal Production Situation

Last week the miners leaders' sent to every mine in Great Britain an appeal for an immediate and supreme effort to increase coal production, warning them that the coal position is far from satisfactory. The appeal, issued by the Executive Committee of the Mine Workers' Federation of Great Britain, stated: "Coal output is falling per man employed; lack of regularity of attendance without reason is on the increase. Unnecessary stoppages have occurred. There is a mentality among some miners that reflects an unconcern for the danger with which the country is faced. These and other deterring production factors perpetrated by the men reflect no credit to our organization. We are not satisfied that all of our members are doing all they can all of the time to produce all the coal the nation now requires. We ask you voluntarily to do those things essential to victory, because if we fail democracy ceases and authority (dictatorship) comes to rule either from within or without."

Personal

By a most unfortunate misunderstanding on the telephone, which made the two place names sound identical, we stated last week that Mr. LUXON, of Guernsey, was in Danzig. Actually he is still in Guernsey, whence he sent the message to which we referred. We apologize for the mistake, and for any anxiety which it may have occasioned.

Obituary

Mr. ARTHUR W. SUMNER, Engineer and Manager of the Grays and Tilbury Gas Company until 1930 and of the Ipswich Gas Company until 1936, when he retired, died on Aug. 18 after a long illness.

Mr. Sumner received his early training under his father while the latter was Manager of the Ilford Gas Company. In 1901 he was appointed general assistant to the Woking District Gas Company, a position he held for two years, when he became District Superintendent to the Mitcham and Wimbledon Gas Company. In 1905 he was appointed District Superintendent of the Grays and Tilbury Gas Company, and in five years succeeded Mr. Thomas Shadbolt as Engineer and Manager.

Mr. Sumner was President of the Eastern Counties Gas Managers' Association in 1921.

* * *

The death has occurred of Mr. J. J. RAWLINGS, Chairman of the Rawlplug Company, Ltd., who invented the rawlplug and other subsidiary fixing devices and tools.

* * *

The death has occurred of Mr. COLIN DOCWRA at the age of 86. Deceased was Senior Director of the Barnet District Gas and Water Company, a Director of the Hampton Court Gas Company and the Woking Water and Gas Company. He was a former Director of the Walton and Weybridge Gas Company, which was later merged with the Wandsworth Gas Company.

Fuel Economy Week at Liverpool

The many and varied industries and interests in a city the size of Liverpool make it difficult to gauge where economies are being effected in fuel by the various sections of the community. It was for this reason that an Urban District Council, wholly residential and situated within the area of the Liverpool Gas Company, was chosen for a Fuel Economy Week.

Each of the 50 shops in the area displayed a card showing 50 hints on "How to Save Fuel," and the whole-hearted co-operation of the local electricity department was secured.

The small town has a newspaper all to itself, and half-page advertisements featured the hints shown in shop windows; a panel on "How to Read a Meter" and an exhortation to "Save Fuel."

A public meeting held in the town was presided over by Mr. C. H. Leach, Secretary and Treasurer of the Liverpool Gas Company, and by the Electrical Engineer of the Urban District Council. Films were shown, including a specially made trailer, and the lack of facilities for poster publicity was balanced by the use of a mobile canteen and demonstration unit, using its loud speakers to advertise the event, to give hints on fuel economy, and to demonstrate the "Recipe of the Week." [See photograph opposite.]

Much publicity was obtained, and it was emphasized that the saving in fuel must of necessity be continued after the "economy" week was over.

Prizes of £3 3s. and £2 2s. were offered for the best suggestions on how to save fuel, and the Gas Company made a special offer to reduce the maintenance fee for cutting down the supply of gas to any appliance in the area during the fuel economy week.

The effort resulted in a saving of 12½% on the corresponding week in 1941.

Ministry of Fuel and Power

The Minister of Fuel and Power has appointed Commander Stephen King-Hall, M.P., R.N. (retired), as Chairman of the Fuel Economy Publicity Committee.

As Chairman of this Committee he will be Director of Publicity in the Ministry of Fuel and Power.

Commander Stephen King-Hall has undertaken these duties in an honorary capacity.

Traction Gas Bags

The British Standards Institution has recently issued a War Emergency British Standard No. 1046 relating to Filling Valves and Hose Connexions for Traction Gas Bags.

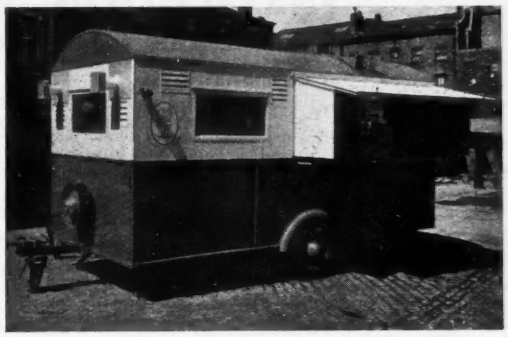
The object of this specification is to ensure interchangeability between the connexions on motor vehicles and on the supply pipes at filling stations. The specification lays down such recommendations in regard to the design of the filling valve as will ensure a satisfactory performance but without restricting individuality in design. Threads for the hose connexions and unions are fully standardized dimensionally to ensure interchangeability.

In an appendix to the specification fully detailed working drawings are given of one type of valve which complies with the general requirements of the specification and which has been found to be satisfactory in practice.

Copies of this specification can be obtained from the British Standards Institution, 28, Victoria Street, S.W. 1, price 2s., 2s. 3d. post free.

U.S.A. Marines in the Gas Light and Coke Company area learn to deal with air-raid damage and broken gas mains. At the microphone, Mr. R. N. Le Fevre.

A General Meeting of the Midland Association of Gas Engineers and Managers will be held in Birmingham (King Edward House), on Sept. 10, at 2.30 p.m., when Mr. E. V. Evans will give an informal Address.



A new mobile canteen and demonstration unit has been acquired by the Liverpool Gas Company to provide hot drinks and food for employees who may be required to work long hours during enemy air raids. The vehicle does not stand idle, however, at other times, as it is being used daily to demonstrate the "Recipe of the Week" and to give hints on Fuel Economy. The public is extremely interested, and the chief difficulty is to find suitable sites where the large numbers of women who congregate do not cause an obstruction.

Tin and its Uses

The current issue of *Tin and Its Uses* (No. 13), published by the Tin Research Institute, is devoted to emergency economies in tin. It is explained that although in normal times the Institute's purpose is to develop new and improved uses for tin, this would be useless at the present time when a large proportion of the world's tin supplies is under enemy control.

During the period of scarcity the Institute offers its services in the solution of tin economy problems. Accordingly, this issue of *Tin and Its Uses* describes practical methods of saving tin in various fields of use. For example, it is shown that important economies can be effected in joining lead-sheathed cables both by using a solder less rich in tin and by the use of a new type of joint requiring not more than one-third the quantity of solder needed for the traditional wiped joint.

A saving of the order of 99% can be effected by using a cup and cone type of joint on lead pipes instead of the usual wiped joint. The ends of the pipes are shaped to male and female cones which are then sweated together with solder foil. A standard lead pipe joined in this way with only 0.05 oz. of solder withstood a pressure of 1,130 lb./sq.in.

Another article describes the advantages of thinly coated electrolytic tinplate as a substitute for ordinary tinplate in the present emergency. An automatic plant of a type suitable for plating batches of standard sized sheets is illustrated.

Tin and Its Uses is obtainable free of charge from the Tin Research Institute, Fraser Road, Greenford, Middlesex.

Substitute Paints (B.S. 1057)

This specification has been prepared at the request received from the Government for a specification to provide for the types of paint to replace "oil paints" where this is possible. Some of the paints specified are therefore complementary to, and not necessarily wholly in substitution for, B.S. 929, which provides for reduced standards of oil paint. It is important in the national interest that these "substitute paints" should be used whenever possible.

Paints have already been developed using wool grease and aromatic petroleum residues in substitution of oil, but with the changing supply position it may well be that still further substitution must be adopted. This specification is very wide in scope ; it does not include details of chemical composition and is based essentially on performance requirements.

The only limitations that have been imposed in regard to composition are those given in an Appendix where, in the event of certain materials being employed, the proportions in which they may be used is limited. The limitations are based on the supply position at the time of the publication of the specification, and may be varied or new materials added from time to time.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

INSTITUTION OF GAS ENGINEERS

AUTHORS' REPLIES TO DISCUSSION ON COMMUNICATION No. 248

(*Concluded from p. 281*)

Dr. H. HARTLEY

As was mentioned when this Paper was presented at the meeting, to obtain a complete picture of the importance of the part played by the Gas Industry in national fuel economy in the domestic field, it is really necessary to consider the weight of coal needed to produce the "fuels" used. It had been arranged, however, that the present Paper should not deal with that phase of the matter.

By collating such information as is available of appliances used throughout the country, and their efficiencies, it has been possible to place in proper perspective the parts played to date by solid fuel in its various forms, gas, and electricity, in satisfying the domestic needs. Mr. Currier has emphasized the need for an up-to-date record of the apparatus installed by gas undertakings. This would be especially valuable if it were supplemented by information as to the fuel used in providing the services needed. With a knowledge of the developments which are taking place in the production of domestic appliances, it seemed useful to put before the Industry information as to the ability of the various industries concerned to provide these services at an economic figure in the post-war period. It is useless to ignore the possibilities offered by coal-consuming or electricity-using appliances.

Mr. Masterman has stressed the fact that although a new manufacturing technique may be developed which will increase production flexibility between coke and gas, it is not likely to affect immediate housing policy. The Gas Industry will have gas and coke to offer. They are fuels which can satisfy the needs of all, and should suit the requirements of most people. It would have been helpful if there had been comment from others with direct interest in the use of coke.

The Paper was completed by the end of March, 1942, before the Beveridge figures were available, and, as Mr. Bennett has indicated, the figure for the annual coal consumption given in the first table is too low. It seems likely that for purely domestic purposes some 45 million tons of coal are used annually. In due course, no doubt, arrangements will at least be made to ensure that bituminous coal is not burned in such a way as to produce smoke. This desirable end could be attained the more rapidly by amicable discussion of the problem with the coal interests. It seems unlikely that the politicians will act drastically and prohibit its use immediately after the war. Mr. Bennett is no doubt right when he says that "very large quantities of coal will continue to be used for at least a generation."

Mr. Davis and Mr. Friedman referred to instantaneous water heaters. My comment concerned the use of such heaters of relatively low output for the provision of hot water for a bath, and is pertinent. It is common knowledge that instantaneous heaters are available with a gas rating of over 100,000 B.Th.U. per hour, just as there are storage heaters with a wide range of capacities. In deciding how gas shall be used to supply hot water, consideration may need to be given to the effect of the demand on the load factor, the service pipes, and the meter. Mr. Holliday has drawn attention to the importance of knowing the load curves for various types of gas appliances, so as to enable the gas supply side to determine what combinations will give the best load factor. Both he and Mr. Davis have mentioned the question of convenience. Gas and electricity can each offer convenience to an extent which is not possible with other fuels. The price which a user will pay for this depends very much on his financial circumstances, and is difficult to assess. No precise credit can be given to gas or electricity for such service.

During the period since the last war, much has been done to popularize background heating and to obtain the load for the Gas Industry by developing highly efficient appliances. It is likely that the provision of background heating will be advocated by architects responsible for the design of houses for post-war use, and the Gas Industry is in a position to ensure that this service shall be brought within the reach of all sections of the community. Within the space available for the Paper it was not possible to do more than touch on this phase of domestic heating services, to which Mr. Chapman has drawn attention. A footnote is added to Table IV indicating the amount of energy that would be available if the hot water systems were insulated, while the figures in cols. 4 and 9 indicate the cost of obtaining energy in the form of hot water. Mr. Andrew has drawn attention to the use that can be made of the data given in Table IV in assessing the cost of employing other combinations of apparatus.

I would again emphasize the importance of using a system of charge which will enable even the smallest consumer to obtain all gas at a low commodity rate, and in conclusion, draw attention to the final paragraph of Mr. Masterman's contribution, in which he urges the immediate necessity for creating and understanding a national fuel policy.

Prof. D. T. A. TOWNEND

I should like to express my thanks to the various contributors to the discussion of my Paper. It is not, of course, possible to consider in detail all the points raised as many of them are matters of personal opinion; also, in certain instances one contribution has furnished an answer to a problem raised in another.

Mr. Hodsman has had long experience in the University training of personnel passing into the gas and allied industries, and special importance attaches, therefore, to the emphasis which he lays on the need for the wider curriculum in Chemical Engineering. As he points out, personnel must be provided equipped not only to deal with the problems connected with current practice, but those which are bound to arise with future developments in the Gas Industry.

Mr. McCulloch mentions that provision is made at the Imperial College of Science and Technology for a student first to qualify in abstract science and afterwards to specialize in Fuel Technology or Chemical Engineering, obtaining in this way a post-graduate diploma. This procedure, however, may well take five years, and, as I have indicated, an alternative four-year degree course in Chemical Engineering was instituted at this College a few years ago.

Mr. Masterman appears to infer that my Paper rather links recruitment into the Gas Industry with research. While the liaison between a University and Industry must be necessarily strong on the research side, it was not my intention to suggest that every student should undertake research—rather the contrary, because some men show little adaptability to it. Indeed, for this very reason we have now provided that in the four-year Honours Gas Engineering Course one or other of either research or advanced study may be chosen. This meets Dr. Chamberlain's point regarding the desirability of all students having an opportunity to secure some insight into research methods; at Leeds all fourth year students have hitherto devoted their final year to research. I should add that I am very much in sympathy with the other points raised by Dr. Chamberlain, particularly that courses calling for cramming rather than development of intellect require revision; also that students should have much more personal contact with University teaching staffs.

Mr. Briggs raises some very pertinent issues. At the moment I do not feel that there is much risk of too many entrants into the Gas Industry receiving University education. In the event of new developments a much broader training than has hitherto been available will be called for; then, as he states, co-ordination of Gas Undertakings into larger units will call for a different system of staffing. In regard to an undertaking bearing the cost of the higher education of suitable employees, there would seem to be little difficulty in coming to a suitable arrangement whereby those concerned would remain with the same concern for a stipulated period; an advantage which I did not mention of an arrangement of this type is that an employee, on coming to the University, would have in mind the special problems of his own undertaking.

I am very grateful to Mr. Grant and Mr. Henshaw for their thoughtful observations. It happens that they have both had close contact with our work at Leeds University, and are both alive to the type of training needed for those passing into the contracting side of the Gas Industry. The point brought out generally, and particularly by Mr. Grant, of the importance that the Industry should realize the value of the trained mind as distinct from the fact-filled mind, cannot be overstressed.

In conclusion, I would draw attention to the recent Messel Lecture delivered before the Society of Chemical Industry* by Sir John Russell, in which many important observations in regard to organized research, which are the outcome of long experience, have been made. These are of great value not only in regard to agricultural research but to industrial research as a whole.

Mr. T. C. FINLAYSON

I am gratified that the contributors to the discussion supported the main theme of the Paper. Dr. Pexton drew attention to the high efficiency which can be attained on modern carbonizing plants; Mr. Sinclair Gaskill suggested that data should be compared against a standard; Mr. Milne pointed out the importance of having the carbonizing plant divided into suitably sized units; Mr. Greenhalgh mentioned the value of regular review of records; Mr. Hawthorne made a suggestion for maintaining constant pressure of producer gas; and Mr. Pearson underlined the importance of reducing calorific value by carbon monoxide and hydrogen rather than by inerts. Although the Paper relates especially to retort house control the Author agrees with Mr. Webber that similar principles can with advantage be applied throughout the works. The remarks by Mr. Pearson and Mr. Hawthorne on the need for improving the working conditions in retort houses have been noted with interest. The lead for such improvements must, for obvious reasons, come from the production side of the Gas Industry, but plant designers will welcome the opportunity of considering the matter.

Mr. Rendle rightly says that the Paper has many phrases which might be regarded as platitudes. The Author looks forward to the day when the efficiency of control in the gas manufacture is such that the Paper will be read as being nothing but a series of platitudes.

* *Chem. and Ind.*, July 25, 1942, **61**, 319.

THE GAS INDUSTRY OF THE FUTURE.—3.

ORGANIZATION OF THE PORT OF LONDON AND THE B.B.C.

The Gas Industry has a great future, but it is generally agreed that it must face radical changes; that it must form opinion within its ranks; and that it must work out its own salvation—or accept the consequences of neglect. To help the Industry to decide which way it wants to go the "JOURNAL" has studied the experiences of other public utility services which have been confronted with similar problems in recent years. The following is the third of a series of articles in which an effort is made impartially to review some of the principal schemes of rationalization in the other industries, with their possible lessons for the Gas Industry. The series covers water supply, passenger transport, the main line railways, port and dock authorities, broadcasting, and the electricity industry.

THE PORT OF LONDON AUTHORITY

THE constitution of the Port of London Authority is worth mentioning as an example of how the common interests of consumers (in this case the shipowners and merchants who used the docks), the local authorities, and the State have been accommodated in the creation of a single body to administer a big public utility business that had outgrown individual private enterprise. Lincoln Gordon, in his book, *The Public Corporation in Great Britain*, sums up the effect of the creation of the Port Authority in this sentence: "Where the old dock companies showed financial debility and lack of adaptability to new ideas, the Authority has brought financial security and continuous development of facilities to a point where in their adequacy to existing and prospective demands they rival any period in the Port's history."

Millions of pounds of shareholders' money was invested in the old dock companies, and when unified operation became necessary, Parliament was confronted with the problem of constituting the new Authority in such a way as to balance the interests of the shareholders with those of the shipowners and merchants to whom the use of the docks was a vital necessity, and those of the general public, as represented by the local authorities and the State. It adopted what at that time was a new experiment in the form of a public corporation, and thus obviated the creation of either a privately owned monopoly, a new municipal body, or a minor State department.

The Port Authority, constituted under the Port of London Act, 1908, was established on March 31, 1909, and consists of 18 elected members and ten appointed members. The Chairman and Vice-Chairman may, but need not, be elected or appointed members, so that the membership varies between 28 and 30. Voting for 17 of the elected members is on a sort of sliding scale, payers of dues, owners of river craft, and wharfingers having varying numbers of votes according to the amounts of dues paid, numbers of craft possessed, and rateable value of premises respectively. The wharfingers have the privilege of electing one member on their own behalf. The ten appointed members represent the Admiralty, Ministry of Transport (2), City of London Corporation (2), London County Council (4), and Trinity House. Both elected and appointed members serve for three years, and ordinary members are unpaid, but salaries may be voted to the Chairman, Vice-Chairman and Chairmen of committees. It is believed that this scheme ensures that the smaller interests are not swamped and that trade and shipping are as equally represented as possible.

The Port Authority paid £23,000,000 for the undertakings of the London and India, Surrey Commercial, and Millwall Dock Companies, and at the same time it took over the rights, powers and duties of the Thames Conservancy below Teddington and those of the Watermen's Company, except certain property and funds. The amount of Port stock issued and outstanding in 1940 was just over £35,000,000. The shareholders of the former dock companies were given Port of London "A" and "B" stock bearing interest at 3 and 4% in amounts sufficient to yield an income equal to that received on the average during the years 1901 to 1907. As in the case of London Transport a quarter of a century later, no allowance was made for the increased security of the new holding and none for the improbability of maintaining existing profits without consolidation of ownership, so that a degree of unnecessary and unjustified burden was placed on the Authority for the 90 years that may elapse before redemption. The dock companies were given the generous terms of 26 years' purchase on existing revenue, although its maintainability was doubtful. An examination of the assets by the Authority's chief engineer shortly after the transfer revealed that the properties had not been maintained in a proper state of repair, and to ensure the efficient and safe working of the undertaking a large and immediate expenditure was necessary, estimated at some £736,000.

About a hundred of the 330 harbours and docks of Great Britain are managed by "public trusts," the chief alternative to operation in conjunction with a railway system. Of the ten leading ports, five are so managed—London, Glasgow, Liverpool, Newcastle, and Belfast. The railways manage three—Southampton, Hull, and Harwich. Manchester is managed by the mixed Manchester Ship Canal Company on which the municipality has a statutory majority of one director, and Bristol is directly managed by the Corporation. The Mersey Docks and Harbour Board at Liverpool, and the Port of London Authority, were evolved from opposite angles, municipal operation in the former case and private in the latter, but both are indicative of the guiding principle that the public concern is the suitable type of management in this sphere of public utility.

One comment remains to be made on the P.L.A., and that is that its jurisdiction does not, by a long way, cover all the import and export facilities on the Thames. It owns the docks, but the wharves remain under individual ownership, and although there are limits to the size and tonnage of ships that can use them, it is a fact that in a normal year about half the business of the Port was done at the wharves. Some of the owners of the wharves observe the same rates as those of the P.L.A., but others enter into competition by charging slightly less. Proprietary rights in the wharves are of many kinds. There are owners of overseas plantations, exporting producers, general merchants, carriers, and so forth, and it would not be easy to effect complete co-ordination. Whether or not the general body of wharfingers would welcome absorption into a more comprehensive port authority is an open question, but the fact that under the present constitution they are not included is a point to be remembered by an Industry that is looking for a working model of co-ordination.

THE BRITISH BROADCASTING CORPORATION

It may be a far cry from gas to broadcasting, but no review of alternative schemes for rationalization would be complete without a glance at the constitution of the British Broadcasting Corporation as a semi-independent type of public corporation. Broadcasting is only about 20 years old, and has been under public control for three-quarters of that time. The original British Broadcasting Company of 1922 was an organization of British manufacturers of wireless apparatus who, in return for their undertaking the financial risks of inaugurating a national broadcasting service, were granted a monopoly both in the provision of the service and in the supply of receiving apparatus for the British market. From the outset there was a considerable measure of control. Receiving licences were issued by the Postmaster-General only to people using apparatus bearing the "B.B.C." mark, and of every fee of 10s. received for the licences, half was handed over to the Company, whose dividends were limited, and who were prohibited from broadcasting paid or advertising matter without special consent. With a view to encouraging radio research the Postmaster-General issued "experimenters'" licences, which, although costing more than the ordinary licences, were free from the restriction regarding the hall-mark of the B.B.C. They were intended only for genuine experimenters, but in a very short time listeners almost everywhere were taking them out and making their own sets, often with components imported from abroad, so that the Company's monopoly in the apparatus market broke down completely.

A year after the inauguration of the wireless, a Departmental Committee recommended to Parliament that "ultimate control" of broadcasting should be in the hands of a Minister, preferably the Postmaster-General, and that he should be assisted by a Broadcasting Board of 13 members, three nominated by the Minister, and ten representing the various interests, but it rejected the principle of complete State operation. Two years later a further Departmental Committee endorsed most of the conclusions reached by the first inquiry, but recommended that the future operating authority should be a public corporation, acting as trustee for the national interest in broadcasting. It was on the basis of this report that the Government proceeded to the establishment of the new operating authority by the method of petitioning the Crown for a Royal Charter of Incorporation.

The British Broadcasting Corporation as we know it to-day thus came into being on January 1, 1926. The first head of the B.B.C., Sir John (now Lord) Reith, was named in the Charter, and provision was made regarding terms of office, re-appointments, and increases in the number of governors. The Corporation differs from such bodies as the Central Electricity Board in that its seven members are appointed, not by a Departmental Minister, but by the Crown, on the advice,

presumably, of the Prime Minister. Whether or not the method of appointment lends itself to the selection of the ablest and most suitable members is a point on which there has sometimes been diversity of opinion, but it is doubtful whether the nation would be enjoying any better broadcasting service to-day if the Corporation were constructed on any other foundation.

The original Charter was operative until 1936, when a new Charter was granted similar to its predecessor, but providing for certain financial changes. In normal times the Corporation receives a substantial percentage of the fees paid by listeners for their licences, and the whole of the surplus profits must under ordinary conditions be devoted to the promotion of its objects. When war broke out the Government assumed control so far as news bulletins and propaganda services in general were concerned, but the operation of broadcasting and the control of everything else in the programmes remained in the hands of the B.B.C., which, as has been stressed on more than one occasion in Parliament and outside, remains independent of Government control except in relation to news and propaganda. As a wartime measure, the financial arrangements under which the B.B.C. received a percentage of licence fees has been suspended, and the contribution from the exchequer takes the form of periodical grants in aid, which are the subject of a vote in Parliament. When broadcasting passed from company to public ownership, the holders of financial interests in the company were paid out, so there are no shareholders or persons possessing proprietary rights of any kind.

Regional broadcasting was being extensively practised before the war, and although temporarily the stations in the Midlands, the North, Northern Ireland, Scotland, Wales, and the West are not transmitting programmes independently, the regional directors are contributing to the maintenance of a properly balanced programme, and the regions enjoy a considerable degree of autonomy. When the regions were mapped out there were some suggestions that each region might be transformed into a miniature B.B.C. with its own board of governors appointed by the Government as the responsible body, each organizing its own programmes subject to interchange arrangements with the national programme, transmitting on one wave-length only, a percentage of the licence fees being allocated to each regional corporation based possibly on the number of listeners in its area. As regards regional programmes, this was actually being done before the war. The regional directors meet at regular intervals at headquarters, and there are seven area councils (one each for London and the six regions) dealing with group listening, religious programmes, and so forth. The requirements of the regions vary so much from time to time that it would be impracticable to make fixed allocations based merely on listener density, and the principle of budgeting at suitable intervals seems to be the only sensible way of settling how much the regions may spend on their programmes.

CARBONIZATION OF DURHAM COALS IN CONTINUOUS VERTICAL RETORTS*

By H. GREENWOOD, Preston Gas Company

THE war has brought many problems to the Gas Industry, and probably one of the major ones is how to meet an increased demand for gas while carbonizing coals much inferior to those used before the war, coals which, in theory at least, may be entirely unsuited to the particular type of plant. During 1940 we at Preston were forced to draw heavily on our reserves of coal in stock without any great hope of replacing them unless deliveries improved. Nor did it seem that deliveries of the Lancashire and Yorkshire washed gas coals we carbonized would improve to any great extent. On the other hand, unscreened Durham coals, which before the war had been shipped from Newcastle down the North Sea mainly to gas-works in the Metropolitan area for carbonization in horizontal retorts, were becoming increasingly available to gas-works in the North of England, so we began to think of this Durham coal as a possible solution to our problem. Accordingly, we began to buy odd train loads of unscreened Durham coal in order to try carbonizing them on a small section of our plant under the same conditions as those to which Lancashire or Yorkshire coals were subjected.

This test, and other similar tests done on unscreened Durham coals, led us to certain general conclusions about the prospect of their carbonization on our plant:

(i) That in carbonizing Durham coals a much lower throughput would be necessary than when using Lancashire or Yorkshire coals. This was a great disadvantage, since it meant that more retorts would be needed to make a given amount of gas, and obviously it also meant that the cost of maintenance and the fuel consumption per therm of gas produced would be higher.

(ii) That when carbonizing unscreened Durham coals we should have no difficulty in maintaining a calorific value of 450 B.Th.U. per cu.ft. after benzole stripping (470 B.Th.U. per cu.ft. before benzole stripping); in fact, that we might experience difficulty in reducing to this quality as the coke produced, being dense and hard, was obviously not very reactive to steaming.

(iii) That any difficulties likely to be experienced due to the higher swelling nature and the irregular size of Durham coals in comparison with screened Yorkshire and Lancashire coals could be minimized by careful attention to rodding and charging at the top of the retort.

(iv) That while the coke produced was denser and harder than coke from the more usual coals, and contained a higher proportion of ash, it was not sufficiently different to lead to any complaints from the consumers. The breeze (*i.e.*, the coke under ¾ in.) from this Durham coke amounted to about 15% of the total, which was about the usual percentage of breeze produced when carbonizing Yorkshire and Lancashire coals.

The low throughput and loss of effective steaming were great deterrents to the use of unscreened Durham coal on the plant, but by this time the coal position was such that we had to have a certain amount of Durham whether we wanted or not. We began to carbonize 100% unscreened Durham on the west bench of the plant, reserving the Lancashire and Yorkshire coals for the east bench, but unfortunately the particular Durham coal we tried to carbonize was much inferior in quality, and contained a much higher proportion of dust than those Durham coals we had previously tried out. In a short time, out of 32 retorts on Durham, 14 were sticking, and we had so much trouble with retorts sticking and working irregularly, to say nothing of the consequent loss of make, that we had to abandon the attempt to carbonize unscreened Durham by itself.

We decided to try mixing the unscreened Durham with the more usual coals received, the percentage of Durham in the mixture being governed by the amount actually received, and also by the purely practical consideration of how much could be carbonized along with other coals without an appreciable loss of throughput and steaming and without trouble in the working of the retorts.

This policy of mixing proved entirely satisfactory, and we began regularly to carbonize a mixture of screened Yorkshire and unscreened Durham coals. Between June and October, 1940, the unscreened Durham we received was 21% of the total coal. The larger portion of this Durham was carbonized almost as soon as it arrived by working it in with other coals.

There are considerable variations in size, analysis, and swelling properties between the different Durham coals, and since size and nature of swelling are two very important points in connexion with any coal which is to be used in continuous vertical retorts, we carefully examined the various Durham coals we received with particular regard to these two factors.

Since we were blending the unscreened Durham coals with other coals of regular size it seemed to us that size was the more important consideration. We noticed that a Durham coal with high swelling properties when examined in the laboratory did not offer any difficulty in carbonization when mixed with an equal or greater part of a medium swelling Yorkshire coal. Any difficulties which were encountered on the plant could be attributed far more readily to the size of the coal and to the large amount of dust than to its high swelling nature.

The Durham coals received at Preston for the past fourteen months have amounted to about 21% of the total coals received. Having resolved as far as possible to dispose of the Durham as it came by working it in with other coals in the maximum quantity possible without seriously interfering with carbonizing conditions in the retort house, we had decided that 25% unscreened Durham in the total coal carbonized was the figure which should not be exceeded, since this enabled us to achieve that object. Each week, therefore, we work to carbonize 25% unscreened Durham and 75% other coals, the other coals being washed Yorkshire or Lancashire gas coals.

From the first it had been decided that it would be better to carbonize the Durham mixture in one particular section of the plant rather than to include Durham in the coal to all the plant, since this enabled us to select the coke for the producers if necessary. Accordingly, the mixture is elevated to four beds, which comprise the west bench of the retort house, while the other beds working receive Yorkshire or Lancashire washed coal. Therefore, although the unscreened Durham in the total coal carbonized is about 25%, the actual percentage of Durham in the mixture elevated to the four beds is much higher and is generally nearer 50%.

Since we began to carbonize unscreened Durham coal by mixing it with other coal the average throughput per retort per day has been about 4.4 tons, the throughput on the beds carbonizing Lancashire or Yorkshire coals being slightly higher, and on the beds carbonizing Durham mixture slightly lower than this figure, so that on the whole we have achieved our object of carbonizing a mixture containing unscreened Durham coals without much loss in throughput and without changing conditions on the plant.

A calorific value of 470 B.Th.U. per cu.ft. before benzole stripping is maintained easily enough, and although it is only to be expected that therms per ton and per retort show a decrease on the figures before we began to have Durham coal, the results as a whole are satisfactory.

* From a Paper to the Manchester and District Junior Gas Association.

TECHNICAL AND ECONOMICAL ASPECTS OF WATER HEATING

A Joint Meeting of the Midland Junior Gas Association and the Midland Gas Salesmen's Circle—the first joint meeting of its kind—was held in Birmingham on July 16, under the chairmanship of Mr. W. N. Smirles, President.

OPENING a discussion on the technical and economic aspects of water heating Mr. **Smirles** said that a major reason for holding the joint meeting was the article in the "GAS JOURNAL" of Dec. 3, 1941, by Mr. Leopold Friedman on Domestic Water Heating. As there were both engineers and salesmen present he looked forward to discussion on the subject from both points of view. He thought there were very few people who were not convinced that at the conclusion of hostilities the Gas Industry would be faced with intensive competition. The factors which would affect the Industry's competitive powers were:

(1) Service value.
(2) Running costs.
(3) Capital costs.

With proper understanding of consumers' requirements, gas service could be pre-eminent. The question of running costs had been dealt with in Mr. Friedman's article. Mr. Smirles did not consider that the Author was fair to some of the gas heaters which he mentioned. For example in regard to gas circulators, he gave an efficiency of 30% and a cost of 6s. 1d. per week for fuel to give a certain volume of hot water, whereas an immersion heater, doing the same amount of work, it was stated, only cost 4s. 9d. and the immersion storage heater was still cheaper. He did not think this ratio would be borne out in practice.

On the question of capital costs, Mr. Smirles considered that two points had to be borne in mind:

(1) In order to burn gas consumers must have appliances.
(2) If one particular type of user was favoured, then it could only be at the expense of some other class of user.

He asked how the balance could be held between different classes of consumers, and wondered if the Industry was making the best use of the facilities at its disposal.

Mr. **Stevenson** (Long Eaton) said the subject would occupy the attention of the Gas Industry after the war. He thought the Gas Industry should concentrate on a simple type of circulator, and considered the question of fitting costs was one of paramount importance. In his opinion the Industry should not be stampeded into putting in instantaneous types of water heaters.

Mr. **Smith** (Derby) said Mr. Friedman's article was bound to cause considerable discussion. He considered the figures used were unsuitable and would be obsolete after the war. He thought about 100 therms per head per annum could be taken as the heat required to provide the maximum requirements of hot water, and this would mean a great volume of gas to the Industry if the whole of the load could be obtained. Not everyone, however, would wish to take advantage of such facilities for providing hot water, and each of the various fuel interests—gas, electricity, coal, coke, and fuel oil—would naturally strive to design appliances most suited to its particular commodity. One of the strongest points for the use of gas was that it is a fuel which can raise a large volume of water to a high temperature in a short time; and the Industry should press this advantage.

Mr. **W. J. Parsons** (Birmingham) said he noted that Mr. Friedman deprecated the use of electricity except for certain special and very limited applications, due to the low thermal efficiency of its generation from coal—*i.e.*, 20.15% or 16.1% at point of use. But Mr. C. A. Masterman, in the discussion on Dr. Hartley's Institution Paper stated "but it [electricity] has a large off-peak capacity which in the interest of the community ought to be used."

Again referring to Mr. Friedman's article, the Author gave 55% and 30% as being the respective useful efficiencies of the multipoint water heater and the circulator, and yet Dr. Hartley, while agreeing with the effective efficiency of the multipoint heater, stated in his Paper: "When used to give the output for which they are designed, the multipoint, insulated storage, and instantaneous heaters show little difference in effective efficiency."

In the Newcastle scheme for the all-gas house (Mr. Crowther's Institution Paper) there was practically no difference in fuel costs for solid fuel and later conversion to all-gas as a heating medium for all purposes. In each case quoted, the water heater was a 30 cu.ft./hr. circulator.

Mr. Friedman mentioned that approximately 16 million new installations would be required every 10–15 years, and of these, 14 million would be in existing property. He, the speaker, suggested that in the great majority of existing properties, some form of storage system would be found. "Are we," he asked, "to persuade the owner or tenant to scrap this entirely and install an instantaneous system at a fairly high capital cost and in the face of intense electrical competition based on permanent hire terms, or are we to go out for the storage heating load with a bold policy?"

Mr. Parsons continued: One of the biggest things we shall have to face in the post-war period will be intense electrical efforts to capture the storage heating load as a means of providing an outlet for the off-peak period, and I visualize the possibility of co-operation between architects and the electrical industry in the building of semi-detached houses and smaller properties, and providing a minimum storage of, say, 80 gallons, suitably insulated, heated during the off-peak period, the current being controlled by, say, a sealed clockwork controller.

It may be argued that we are fighting a losing battle in trying to compete with the electric storage heater. I do not agree. Our big advantage is flexibility of gas rate, and our disadvantage in pre-war days was the fact that the immersion heater could be obtained on permanent hire terms. I know that our fixing may not be carried out so easily as an immersion heater, but the fact remains that it was the selling policy that promoted the popularity of the electric immersion heater. What we require is a really virile policy with possibly permanent hire for certain types of water heater.

I do not think we should ignore the existence of a large potential storage heating load, and concentrate on instantaneous heating only.

Two things are necessary when considering the installation of a circulator or combined storage heater: (*a*) Minimum storage required; (*b*) recovery rate of the heater.

In my experience, nothing less than a heater having an input of 15,000 B.Th.U. per hour should be fitted. More use should be made of the "Economy" valve, whereby only a portion of the storage is heated; intermittent control by hand or clock is more economical than continuous heating coupled with reliance on a thermostat; storage and circulation pipes should be lagged, the latter by means of neat, sectional insulation.

From the undertaking's point of view, maintenance is less and more easily carried out due to simpler construction. Large services, meters, and supplies are not required. If care is taken in choosing a suitable size of circulator in conjunction with the size of storage available, together with the estimated hot-water requirement, hot water is available in quantity whenever it is needed, whereas satisfactory operation of the instantaneous heater requires a constant head of water which can only be obtained from a tank. This in many cases is impracticable, and necessitates the heater being fixed direct to the main, with attendant difficulties and troubles.

Mr. J. G. Bennett (British Coal Utilization Research Association) mentioned in the discussion on Dr. Hartley's Paper the improvement of the solid fuel cooker, and this apparatus, when combined with a water heater, can show a very strong case. It seems to me that as well as intense electrical competition there will also be a serious attempt on the part of the solid fuel producers and appliance producers to retain the storage heating load, which will have the serious backing of the plumbing and heating trade generally.

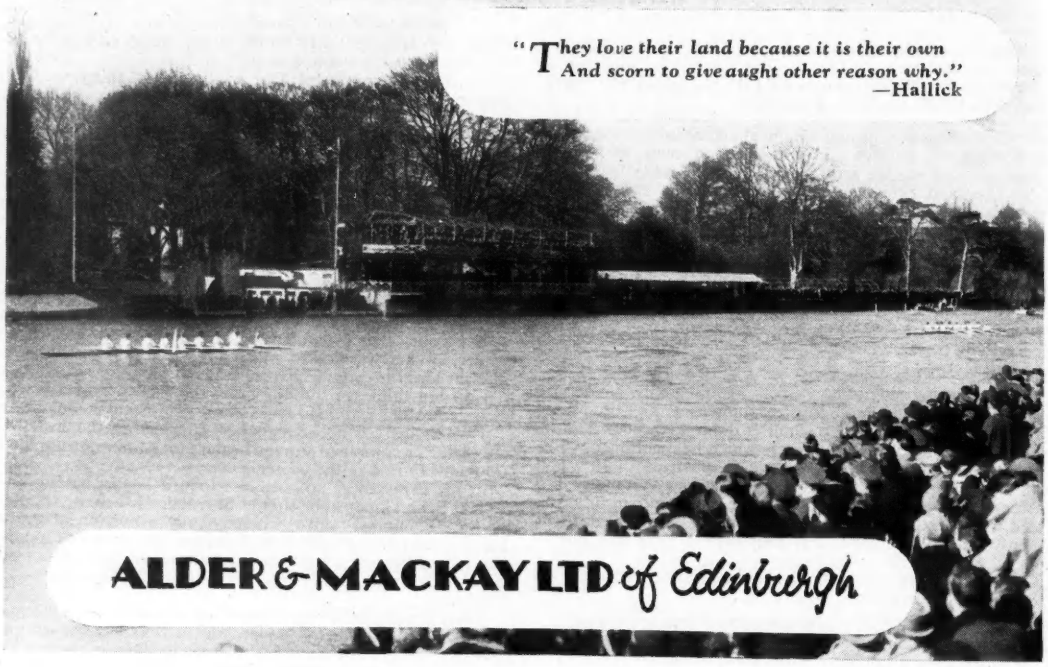
Mr. **Smith** said he considered the question of the manual operation of heaters was an important one. The fact must not be neglected, however, that people were hoping to be living in an automatic age and would expect equipment to be controlled for them. He thought it should be possible to achieve full automatic control of gas water heaters.

Mr. **Jenkins** (Leamington) referred to the large number of houses which would have to be built after the war, and suggested the desirability of equipping these for central heating. Solid fuel could be used for this purpose with gas fires to give a more comfortable temperature in rooms actually in use. He thought it should be possible to design a gas water heater which would take the water heated to a low temperature by the central heating boiler, and thus effect a considerable economy of fuel. He supported many of the points brought forward by Mr. Parsons, particularly those relating to the storage heater. There was a lot to be said for manual control. He considered the electric immersion heater had a big pull owing to the ease with which it could be fixed.

Mr. **Coleman** (West Bromwich) considered that the spearhead of the Industry's advertising should be "Instant gas for instant hot water." In his opinion this load would not be obtained with gas at 10d. or even 8d. per therm, and he considered it would be necessary to introduce two-part tariffs.

Mr. **Bingham** (Leicester) supported the suggestion of incorporating water heating and central heating, and thought there should be an immense scope for a modified form of central heating in houses built after the war.

The Annual Meeting of the North British Association of Gas Managers will be held in Glasgow on Sept. 4 under the Presidency of Mr. R. D. Keillor, of Greenock, when Papers will be given by Messrs. W. Kirk (Motherwell) and A. F. Pollock (Edinburgh).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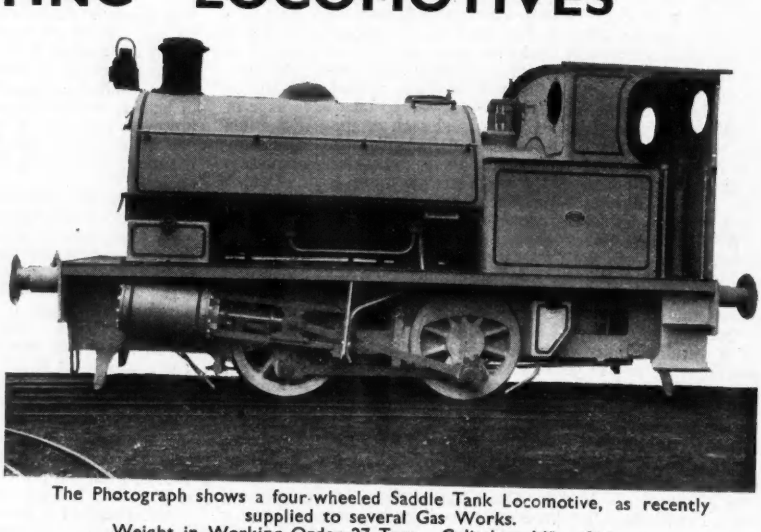

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AMMONIUM SULPHATE PRODUCTION*

By W. TIDDY,

Director of Research, Semet-Solvay Company, New York

SEMET-SOLVAY Engineering Corporation has developed a radically new type of process embodying four important principles:

(1) Economical production of ammonium sulphate solution of necessary concentration for subsequent crystallization.

(2) The use of a high concentration of crystal magma in the crystallization step.

(3) The maintaining of crystals in circulation.

(4) Regulation of the supersaturation of the solution.

The new process involves the use of a scrubber for the recovery of ammonia from coke oven gas in which a circulating stream of ammonium sulphate containing free sulphuric acid is passed in countercurrent contact with the gas for recovery of ammonia. This stream is then pumped into a vaporizing zone, where it is cooled by evaporation to a supersaturated condition. The resultant supersaturated solution then passes through a bed of crystals to cause deposition of crystals on the crystal bed. The mother liquor produced in this system flows to the mixing tank, where water and sulphuric acid are added as required by the process.

To effect the cooling by evaporation in this process a "Krystal" unit, to which Semet-Solvay Engineering Corporation acquired the exclusive rights for the by-product coke industry in the United States, was chosen.

After successful experiment, a commercial plant handling in excess of 10,000,000 cu.ft. of gas per day was installed. The equipment produces varying sizes of ammonium sulphate crystals under operative control. The largest crystals produced were one-eighth of an inch by three-eighths of an inch; and other sizes are recorded in Table I.

In the new process, coke oven gas is pumped by exhausters through

TABLE I.—SCREEN TEST.

	New Process Ammonium Sulphate.			Typical By-product Coke Plant Sulphate.		
	+10	5.2	0.0	0.0	+10	0.1
−10	+20	61.5	39.9	17.6	+20	1.0
−20	+40	28.3	52.8	62.9	+40	19.2
−40	+60	3.6	5.7	15.6	+50	31.2
−60	+80	0.7	0.8	2.7	+70	27.6
−80	+100	0.3	0.5	1.0	+100	13.1
−100		0.4	0.4	0.2		7.8

the P and A tar extractor and gas reheater, meeting the ammonia gas from the ammonia still, and is passed through a countercurrent scrubber in which it is sprayed with a concentrated ammonium sulphate solution containing approximately 4% sulphuric acid for the absorption of ammonia. The solution leaving the scrubber is pumped to the circulating solution in the crystallizer and conducted up to the vaporizer, where the sensible heat of the feed and the heat of crystallization are utilized to vaporize sufficient water to cool the solution to the required temperature by means of vacuum evaporation. The solution is brought to the required supersaturated condition and circulated through the suspended bed of crystals in the crystal chamber, where the supersaturation is removed and deposited on pre-existing crystals. The heavier crystals gravitate to the base of the crystal chamber and are pumped to the slurry tank. From the slurry tank the sulphate crystals and mother liquor are fed to a Sharples continuous centrifuge for removal of the mother liquor, the washing of the salt free from acid, and drying, and are automatically discharged into the sulphate storage pit. The overflow of mother liquor from the crystal chamber flows to a mixing tank, where it is replenished with sulphuric acid and water and recirculated over the ammonium sulphate scrubber for the absorption of more ammonia.

The sulphate scrubber is so designed that the top 4 ft. act as an acid separator to remove any spray carried over from the absorption section.

The process is easily controlled by the differential temperature between the solution leaving the scrubber and the solution leaving the crystal chamber, and by an hourly determination of free acid in the solution leaving the scrubber. The free acid in the solution is such that the ammonium sulphate produced contains from 0.02 to 0.05% of free acid without neutralization. The moisture content of the sulphate produced in a continuous Sharples centrifugal dryer has been from 0.6 to 0.9%.

In this new operation we obtain a very low differential through the scrubber—2.5 in. of water; we are producing 13 tons of sulphate per day; and the unit has successfully handled gas rates varying from 4.5 to 10 million cu.ft. per day with a variation of as much as 250,000 cu.ft. per hour.

The difference between the pressure drop of 2.5 in. of water across the new scrubber and the 35–40 in. required by the standard saturator is responsible for a substantial saving of steam in the operation of the exhausters.

The relative amounts of water, steam, power, and air for standard saturator and new process operations are shown in Table II.

TABLE II.—COMPARATIVE WATER, STEAM, POWER, AND AIR REQUIREMENTS.

	Per Ton of Sulphate.	
	Standard Process.	New Process.
H.P. steam—lb.	11,123	7,435*
L.P. steam—lb.	1,193	230
Water—gallons	Nil	12,510*
Electric power—kw.h.	Nil	30.3
Air—cu.ft.	4,001	Nil

*82° F.

Table III sets forth comparative operating conditions for the two processes.

TABLE III.—COMPARATIVE OPERATING CONDITIONS.

	Standard Process.	New Process.
Gas passed—1,000 cu.ft./day	10,768	10,450
Sulphate production—lb./day	26,150	26,470
Ammonia in gas outlet from saturator —lb. $(NH_4)_2SO_4$/10,000 cu.ft. gas	0.129	0.145
Carry-over from scrubber—c.c.	...	75
Gas temperatures—°F.:		
Inlet to exhauster	93	95
Outlet from exhauster	105	...
Inlet to saturator	150	...
Inlet to scrubber	...	116
Leaving saturator	130	...
Leaving scrubber	...	117
Saturator bath	139	...
In crystal chamber	...	111
Solution—mixing tank	...	112
Solution—base of scrubber	...	127
Pressures:		
Gas inlet to exhauster	−10 in. H_2O	−10 in. H_2O
Gas leaving exhauster—		
Average	+72	+35
Minimum	+62	+32
Maximum	+83	+38
Pressure loss through scrubber	...	2.5

The advantages of the new process are:

1. Less ground is required for the installation.
2. The gas pressure after the exhauster is lower and more uniform.
3. Operating costs are reduced.
4. The salt is cleaner than that obtained under similar operating conditions in a standard saturator.
5. No daily killing of the saturator bath is necessary.

Some rock formations were observed in the crystal chamber during the production of 180 tons of sulphate in 14 days. These were readily removed, however, without shutting down the plant or losing any ammonia from the coke-oven gas. The procedure for this removal will be a regular routine matter, consisting of removal of the crystals from the chamber, addition of acid and water to the system, and reduction of circulation in the crystal chamber. This treatment practically dissolved the small amount of rock salt formation and the process has resumed normal operations in about four hours.

6. The product is improved.

The ammonium sulphate produced by the new process is superior both in appearance and in free-flowing characteristics. This is of definite importance to the by-product coke industry in meeting the increasingly severe competition from other nitrogen fertilizer materials.

* From notes on informal discussion at Carbonization Luncheon, A.G.A. Joint Production and Chemical Committee Conference, May 26.

The Metropolitan Gas Company of Melbourne reports a net profit for the year ended June 30 of £195,685. It has been decided to transfer £10,000 to pay a final dividend of 6s. 6d. per share, and to carry forward £82,382.

Dividends for the half-year ended June 30 have been declared at the following rates per annum, less income-tax, by the Croydon Gas Company: Preference Stock, 4%, Maximum Dividend Stock, 5% Sliding Scale Stock, 6%.

Mr. R. Wilson Bartlett, J.P., Deputy Chairman of the Newport Gas Company, presided at Crindau Gas-Works annual produce and flower competitions at Crindau (Newport), and was supported by Mr. G. M. Gill, Mr. C. O. Lloyd, and Mr. J. H. Canning, J.P., O.B.E., Directors, Mr. R. S. Snelling, J.P., General Manager and Secretary, and Mr. J. F. Rust, Engineer.

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Gas Products Prices

The London Market Aug. 24.

The only change in the prices of Coal Tar Products in the London Market refers to 95/160 Solvent Naphtha, which is now about 2s. 3d. to 2s. 7d. per gallon.

The Provinces Aug. 24.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 10d., pure, 2s. 5d. (controlled by the Control of Toluene No. 2 Order, July 3, 1941, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 1s. to 1s. 4d. according to quality. Solvent naphtha, naked, North, 2s. 2d. to 2s. 6d. Heavy naphtha, North, 1s. 10d. to 1s. 11d. Carbolic acid, 60's, controlled by the Coal Tar Acids Prices (Inland) Order, 1942, operative from May 1. Naphthalene, controlled by the Naphthalene prices (Inland) Order, 1942, dated April 15, 1942, and operative from May 1, 1942, £19 to £19 10s.—bags free. Anthracene, controlled by the Anthracene Prices (Inland) Order, 1942, operative from May 1. Filtered heavy oil (min. gr. 1,080), 7½d. to 8d. Creosote oil has been generally controlled as to direction and price for some time past. Current value—fuel grades 5d. to 5½d; timber preservation and other purposes 4¾d. to 6d. These prices apply as from May 13.

*In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland Aug. 22.

Market position shows no alteration. Refined tar controlled. Value about 4½d. per gallon *ex* Works, naked. Creosote oil: Specification oil, 6¾d. to 7d.; low gravity, 7¼d. to 7½d.; neutral oil, 6¾d. to 7d. per gallon; all *ex* Works in bulk. Cresylic acid continues active at 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha, 6½d. to 7d. Solvent naphtha: 90/160 grade, 2s. to 2s. 3d., and 90/190 Heavy Naphtha, 1s. 9d. to 2s. per gallon. Pyridine: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

Gas Stocks and Shares

Markets for the most part were hesitant last week and the volume of business very small. Similar conditions also prevailed in the Gas section where, although the numbers of recorded transactions were on a reduced scale, prices continued firm and the few quotations which were altered moved upwards. It will be seen that a number of stocks were marked *ex* dividend during the week. A satisfactory feature is that the prices of the Bombay and Oriental stocks have suffered no further relapses.

The following prices were changed during the week:

PROVINCIAL EXCHANGES

Great Grimsby "A" (x.d.)	155—165	Aug. 10	
Ditto "B" (x.d.)	155—165	,,	
Ditto "C" (x.d.)	145—155	,,	
Ditto Ord. (x.d.)	14—18	,,	
Liverpool Ord. (x.d.)	102½—104½	,,	
Newcastle 3½ p.c. Deb.	87½—88½	+1	
Preston "A" (x.d.)	150—160	Aug. 10	
Ditto "B" (x.d.)	109—119	,,	
Weston-Super-Mare Ord. (x.d.)	93—97	,,	

OFFICIAL LIST

Associated Gas & Water Undertakings 4 p.c. Cum. Pref.	13/—15/-	+1/-
Bournemouth Gas & Water Ord. (x.d.)	134—139	Aug. 17
Ditto 4 p.c. Deb.	98—103	+3
Commercial 3 p.c. Deb. (x.d.)	95—100	Aug. 17
East Surrey "B" Ord. (x.d.)	80—85	,,
Portsmouth Cons. (x.d.)	92—97	,,
South-Eastern Gas Corporation Ord.	15/—17/-	+-/6d.
Southampton Ord. (x.d.)	72—77	Aug. 17
Swansea 5½ Red. Pref. (x.d.)	95—100	,,
Tottenham Ord. (x.d.)	86—91	,,
Ditto 5 p.c. Pref. (x.d.)	95—100	,,
Ditto 4 p.c. Deb.	90—95	+3
United Kingdom 4½ p.c. 1st Pref.	17/—19/-	+-/6d.
Wandsworth 4 p.c. Pref.	78—83	+1
Ditto 4 p.c. Deb.	90—95	+1

SUPPLEMENTARY LIST

Cheltenham Ord. (x.d.)	95—100	Aug. 17
East Surrey 5 p.c. Pref. (x.d.)	95—100	,,
Ditto 6 p.c. Pref. (x.d.)	115—120	,,
Hampton Court Ord. (x.d.)	95—100	,,
Uxbridge 5 p.c. Deb.	107—112	+2

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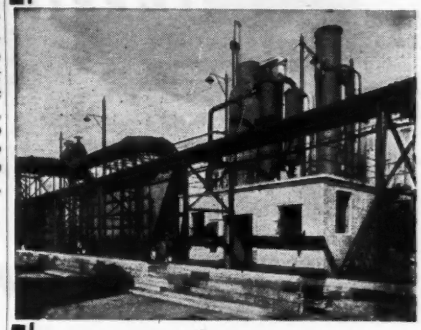
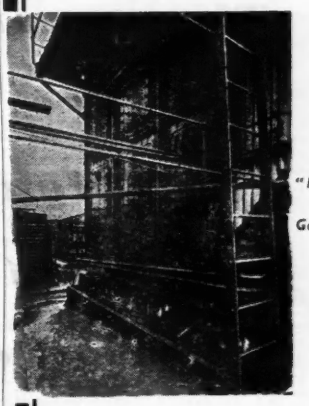


"Permac" Joints in a Gas Works.



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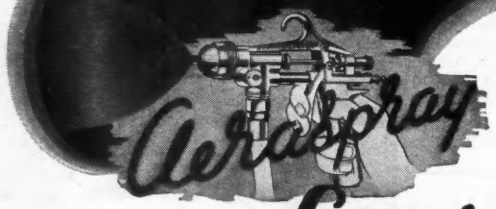

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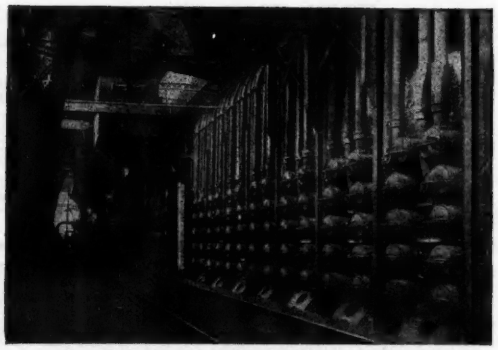

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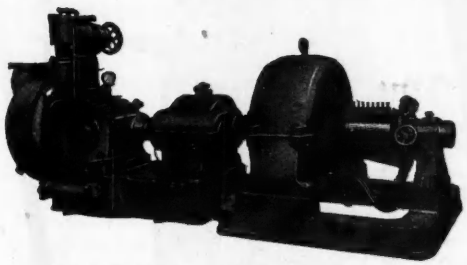

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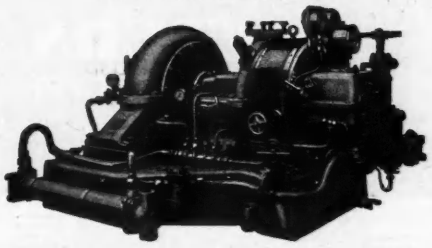

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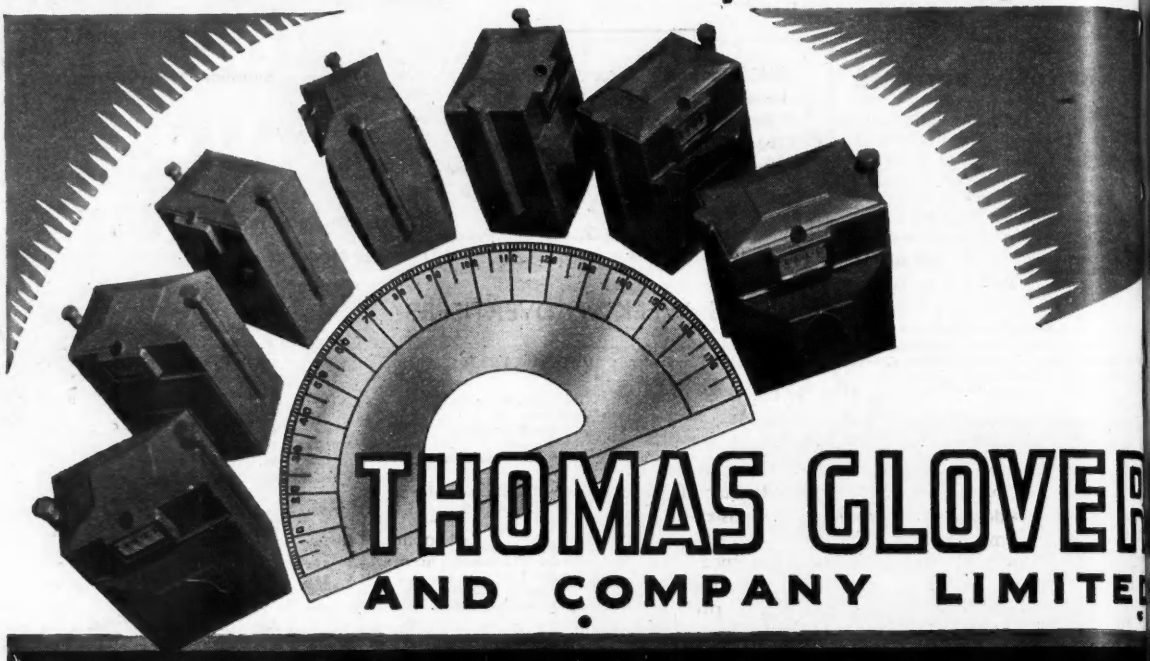

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